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FOURTH PROGRESS REPORT

Paleo river beds detection by means of multispectral images taken from Skylab.

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INTRODUCTION

This work is the result of a joint research of the Laboratorio per la Geofisica della Litosfera and the Laboratorio di Geologia Applicata allo Studio delle vie di Comunicazione nel Settore Alpino Padano-C.N.R. - concerning the problem of the detection of gravely and sandy areas in the Venetian Plain (North of Padua).

The choice of such topic and so well defined area of investigation has been suggested by the existence of a supply programme for building materials, as well as a good scientific background, and a very precise ground truth.

In this area (Fig.1) there are two rivers, the Brenta and the Astico; by means of multispectral analysis, utilizing analog techniques, we discovered the patterns of the paleo-beds of these two rivers, by quick, precise, and economic methods.

For this research we had at our disposal a complete set of data , and an accurate aereal photo-interpretation.

The synthesis of the collected data given by the Skylab frames and by the enhancement techniques, seem to be the right approach for the proposed problem.

We employed the data of the S 190 A multispectral camera, and in particular the 42, 41, 38, 37 bands of the SL 3 mission (September 1973).

By the use of the cross density slicing, masking slicing, ratio's additive color synthesis, false color composition methods we achieved the best results for the solution of the proposed problem.

In particular we observed that the masking of bands 41 and 38 in the form of ratio was the best for this purpose, the masking ratio between 41 and 37 bands ranking second.

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In figure 1 the investigated areas is shown; in figure 2 the masking ratio $\frac{41}{38}$ (that is the positive of 41 band superimposed on the negative of 38 band), is presented.
In figure 3 a thematic map is shown, drawn following the results of figure 2 where it is possible to see the unknown patterns of the Brenta's and Astico's paleo river beds.
By electronic density slicing these results were enphasized; it was possible to plot the underground water rising line with a very high precision.
These positive results show that the multispectral images, treated by this methodology, not only give more continuity to the previous scattered data already known in the Venetian Plain, but point out new hydrogeological patterns.

F I G U R E S

Fig. 1 - The investigated area

Fig. 2 - Masking ratio $\frac{41}{38}$ bands

Fig. 3 - Map of the results

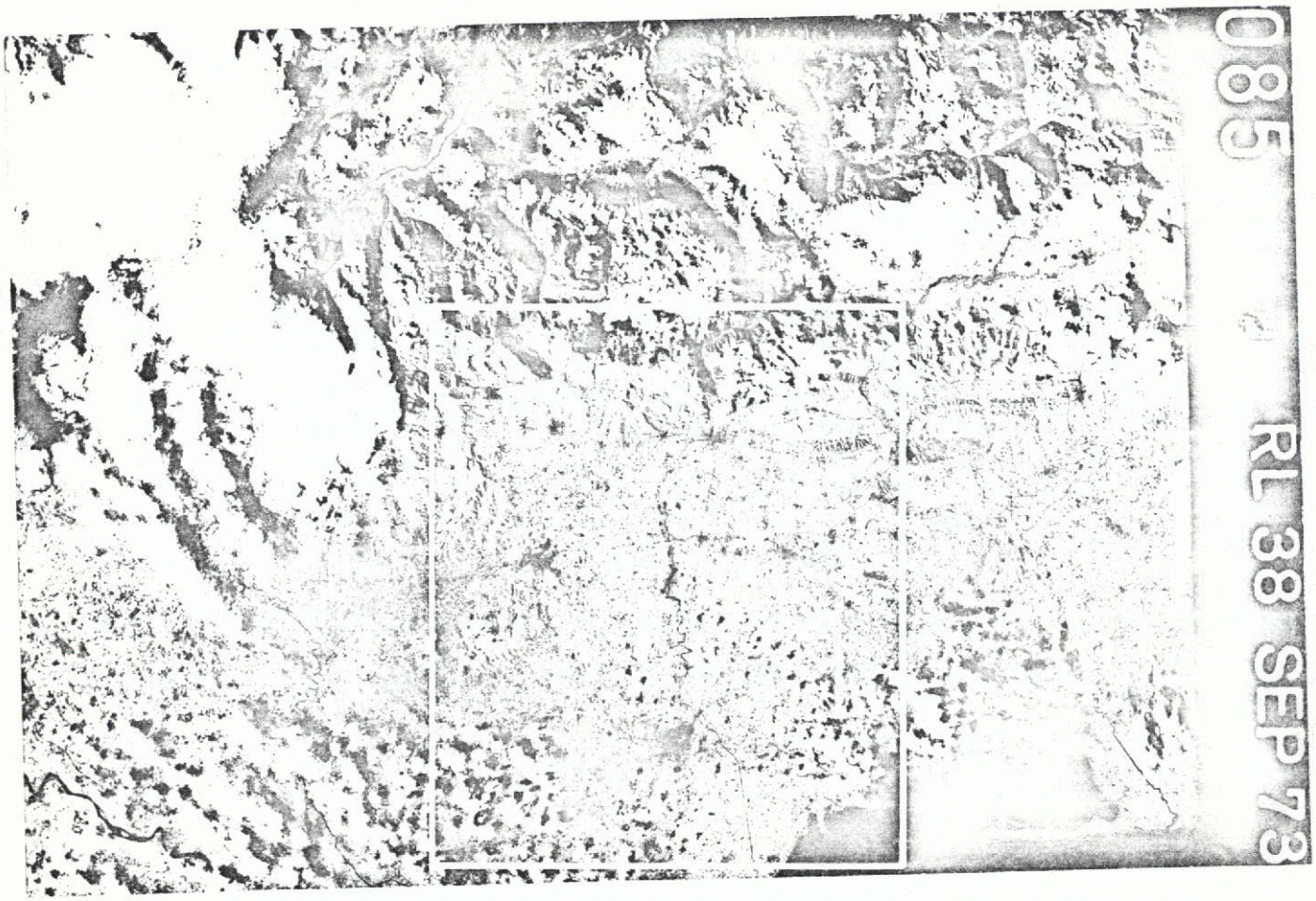
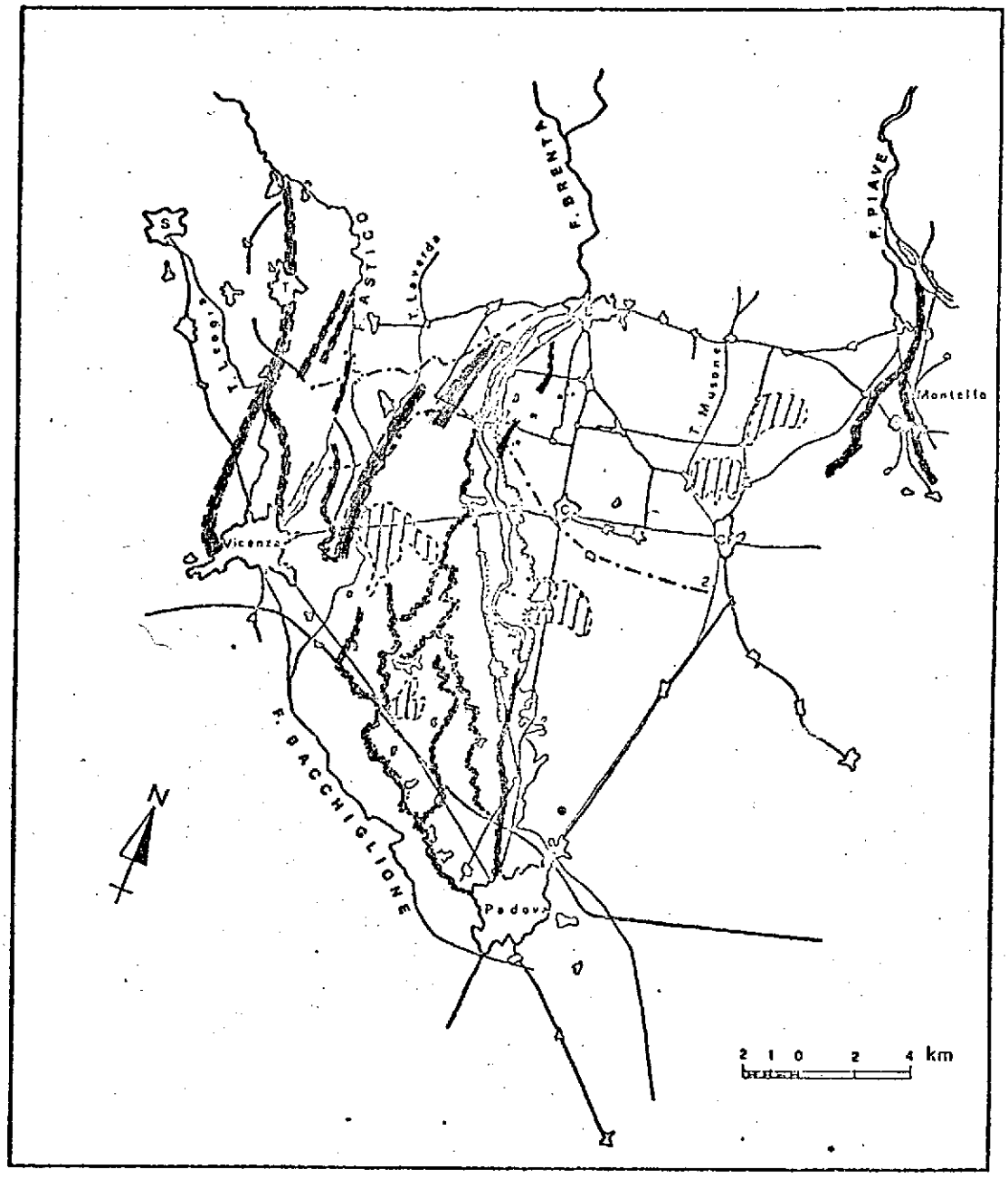


Fig. 1 The investigated area.
Approx scale 1: 500.000

Fig. 2 Hard copy of the original masking ratio 41:38
This image was utilized for the discover
of Brenta and Astico paleo river beds that
you can see in red in the figure 3

FIG. 3



LEGEND

- Paleo river-bed
- Alluvial terraces
- Old river winding
- Boundary of fresh water springs (1, 2)
- Gravel and sand deposits
- Alluvial materials
- Urban areas
- High way
- Main road